

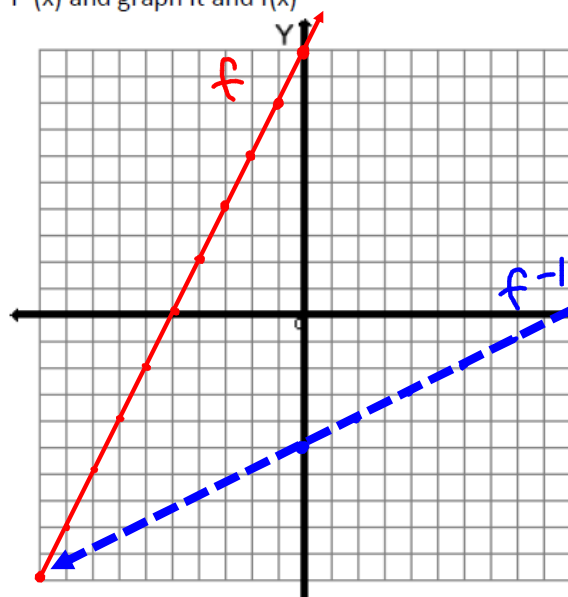
$$f(x)=2x+10$$

$$g(x)=x^2+4$$

$$h(x)=-3x-1$$

Find the following.

1) $f^{-1}(x)$ and graph it and $f(x)$



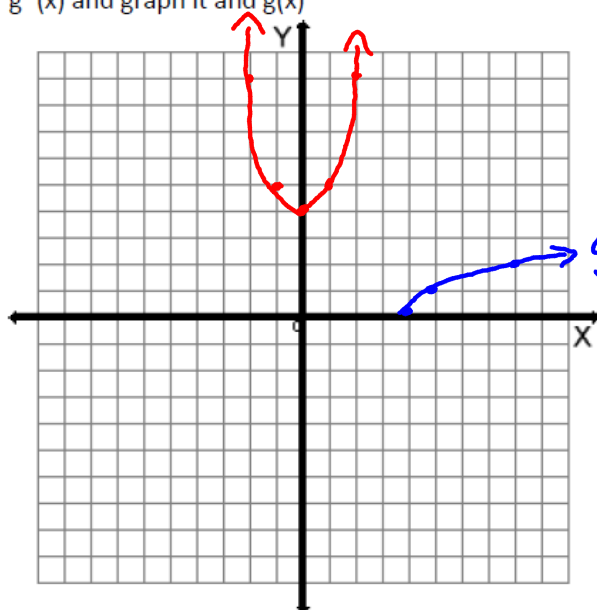
$$\begin{aligned} y &= 2x+10 \\ x &= 2y+10 \\ -10 & \quad -10 \\ x-10 &= 2y \\ \frac{x-10}{2} &= y \\ f^{-1}(x) &= \frac{x}{2} - 5 \end{aligned}$$

$$f(x)=2x+10$$

$$g(x)=x^2+4$$

$$h(x)=-3x-1$$

2) $g^{-1}(x)$ and graph it and $g(x)$



$$\begin{aligned} y &= x^2+4 \\ x &= y^2+4 \\ x-4 &= y^2 \\ \sqrt{x-4} &= y \\ g^{-1}(x) &= \sqrt{x-4} \end{aligned}$$

x	y
4	0
5	1
8	2

$$g(x)=x^2+4$$

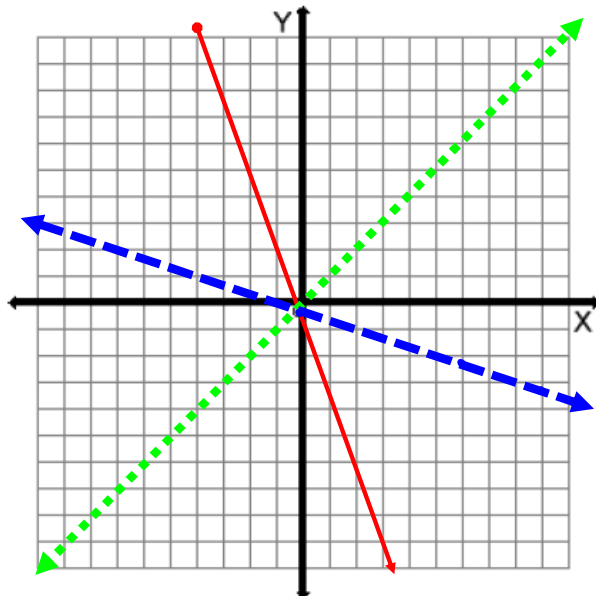
x	y
0	4
1	5
2	8

$$f(x)=2x+10$$

$$g(x)=x^2+4$$

$$h(x)=-3x-1$$

3) $h^{-1}(x)$ and graph it and $h(x)$



$$\begin{aligned} y &= -3x - 1 \\ x &= -3y - 1 \\ x + 1 &= -3y \\ \frac{x+1}{-3} &= y \\ \frac{x}{-3} + \frac{1}{-3} &= y \end{aligned}$$

$$f(x)=2x+10$$

$$g(x)=x^2+4$$

$$h(x)=-3x-1$$

$$4) (f+g)(x) = 2x+10+x^2+4$$

$$(f+g)(x) = x^2 + 2x + 14$$

$$\begin{aligned} 5) (f+g)(4) &= 4^2 + 2(4) + 14 \\ &= 16 + 8 + 14 \\ &= 38 \end{aligned}$$

$$f(x)=2x+10$$

$$g(x)=x^2+4$$

$$h(x)=-3x-1$$

$$\begin{aligned} 6) (f-g)(x) &= (2x+10)-(x^2+4) \\ &= 2x+10-x^2-4 \\ &= -x^2+2x+6 \end{aligned}$$

$$\begin{aligned} 7) (f-g)(2) &= -(2)^2+2(2)+6 \\ &= -4+4+6 \\ &= 6 \end{aligned}$$

$$f(x)=2x+10$$

$$g(x)=x^2+4$$

$$h(x)=-3x-1$$

$$\begin{aligned} 8) (fg)(x) &= (2x+10)(x^2+4) \\ &= 2x^3+8x+10x^2+40 \\ &= 2x^3+10x^2+8x+40 \end{aligned}$$

$$\begin{aligned} 9) (fg)(2) &= 2(2)^3+10(2)^2+8(2)+40 \\ &= 2(8)+10(4)+16+40 \\ &= 16+40+16+40 \\ &= 112 \end{aligned}$$

$$f(x)=2x+10$$

$$g(x)=x^2+4$$

$$h(x)=-3x-1$$

$$\begin{aligned} x^2+4 &= 0 \\ -4 &-4 \\ x^2 &= -4 \end{aligned}$$

$$10) (f/g)(x)$$

$$= \frac{2x+10}{x^2+4} = \frac{2(x+5)}{x^2+4}$$

$$11) (f/g)(-3)$$

$$= \frac{2(-3)+10}{(-3)^2+4} = \frac{-6+10}{9+4} = \frac{4}{13}$$

$$f(x)=2x+10$$

$$g(x)=x^2+4$$

$$h(x)=-3x-1$$

$$12) (g+h)(x)$$

$$= x^2 - 3x + 3$$

$$13) (g+h)(10)$$

$$\begin{aligned} &= 10^2 - 3(10) + 3 \\ &= 100 - 30 + 3 \\ &= 73 \end{aligned}$$

$$f(x)=2x+10$$

$$g(x)=x^2+4$$

$$h(x)=-3x-1$$

$$\begin{aligned} 14) (g-h)(x) &= (x^2+4) - (-3x-1) \\ &= x^2+4+3x+1 \\ &= x^2+3x+5 \end{aligned}$$

$$\begin{aligned} 15) (g-h)(3) &= 3^2+3(3)+5 \\ &= 9+9+5 \\ &= 23 \end{aligned}$$

$$f(x)=2x+10$$

$$g(x)=x^2+4$$

$$h(x)=-3x-1$$

$$\begin{aligned} 16) (gh)(x) &= (x^2+4)(-3x-1) \\ &= -3x^3 - x^2 - 12x - 4 \end{aligned}$$

$$\begin{aligned} 17) (gh)(10) &= -3(10)^3 - (10)^2 - 12(10) - 4 \\ &= -3(1000) - 100 - 120 - 4 \\ &= -3000 - 100 - 120 - 4 \\ &= -3,224 \end{aligned}$$

$$f(x)=2x+10$$

$$g(x)=x^2+4$$

$$h(x)=-3x-1$$

$$18) (g/h)(x)$$

$$= \frac{x^2+4}{-3x-1}, x \neq -\frac{1}{3}$$

$$\begin{aligned} -3x-1 &= 0 \\ +1 &+1 \\ -3x &= 1 \\ x &= -\frac{1}{3} \end{aligned}$$

$$19) (g/h)(-4)$$

$$= \frac{(-4)^2+4}{-3(-4)-1} = \frac{16+4}{12-1} = \frac{20}{11} = 1\frac{9}{11}$$

$$f(x)=2x+10$$

$$g(x)=x^2+4$$

$$h(x)=-3x-1$$

$$20) (f(g(x)))$$

$$\begin{aligned} &= 2(x^2+4) + 10 \\ &= 2x^2 + 8 + 10 \\ &= 2x^2 + 18 \end{aligned}$$

$$21) (f(g(2)))$$

$$\begin{aligned} &= 2(2^2) + 18 \\ &= 2(4) + 18 \\ &= 8 + 18 \\ &= 26 \end{aligned}$$

$$\begin{aligned} g(2) &= 2^2 + 4 = 8 \\ f(8) &= 2(8) + 10 \\ &= 26 \end{aligned}$$

$$f(x)=2x+10$$

$$g(x)=x^2+4$$

$$h(x)=-3x-1$$

$$\begin{aligned} 22) \quad (g(h(x))) &= (-3x-1)^2 + 4 \\ &= 9x^2 + 6x + 1 + 4 \\ &= 9x^2 + 6x + 5 \end{aligned}$$

$$\begin{aligned} &(-3x-1)(-3x-1) \\ &9x^2 + 3x + 3x + 1 \\ &9x^2 + 6x + 1 \end{aligned}$$

$$\begin{aligned} 23) \quad (g(h(5))) &= 9(5)^2 + 6(5) + 5 \\ &= 9(25) + 30 + 5 \\ &= 225 + 30 + 5 \\ &= 260 \end{aligned}$$

$$f(x)=2x+10$$

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$$\begin{aligned} 24) \quad (f(h(x))) &= 2(-3x-1) + 10 \\ &= -6x - 2 + 10 \\ &= -6x + 8 \end{aligned}$$

$$\begin{aligned} 25) \quad (f(h(7))) &= -6(7) + 8 \\ &= -42 + 8 \\ &= -34 \end{aligned}$$